New England Common Assessment Program

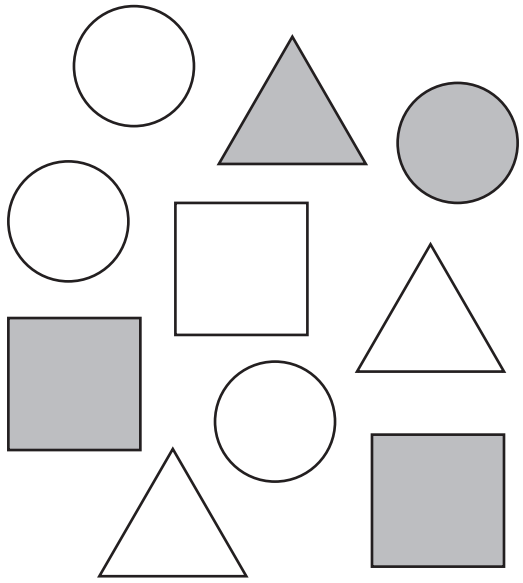
Released Items 2009

Grade 5 Mathematics

Mathematics

Items with this symbol were selected from Session One—no calculators or other mathematics tools allowed.

1 Look at this set of shapes.



What fraction of the set of shapes is shaded gray?

A. $\frac{4}{10}$

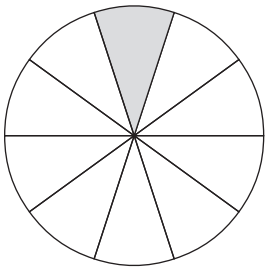
B. $\frac{4}{6}$

C. $\frac{6}{4}$

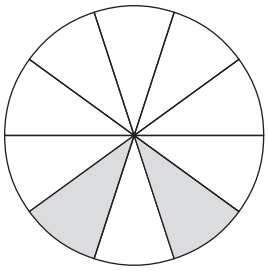
D. $\frac{10}{4}$

2 Which picture shows $\frac{1}{5}$ of the circle shaded gray?

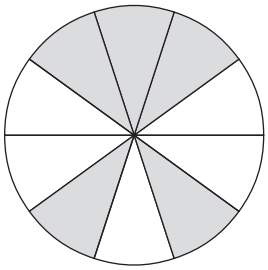
A.



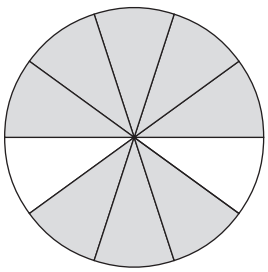
B.



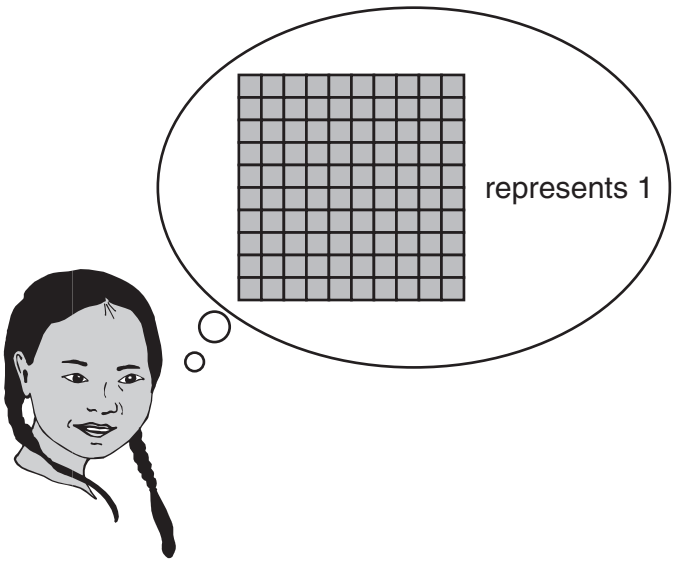
C.

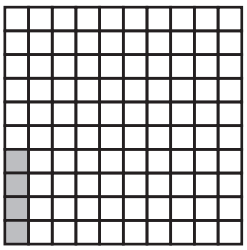


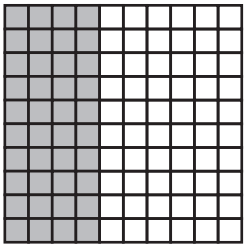
D.

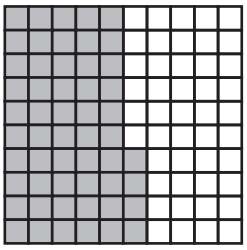


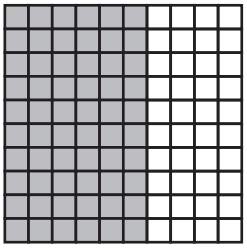
❸ Which model is shaded gray to represent a decimal **greater** than 0.3 and **less** than 0.5?



A. 

B. 

C. 

D. 

❹ Look at this number sentence.

$$\mathbf{12 \times \square = 168}$$

Which number sentence is equivalent to the number sentence above?

A. $168 \times 12 = \square$

B. $168 \div 12 = \square$

C. $\square \div 12 = 168$

D. $168 - \square = 12$

❺ A rope that is 10 meters long is cut once. Which measures could be the lengths of the two pieces?

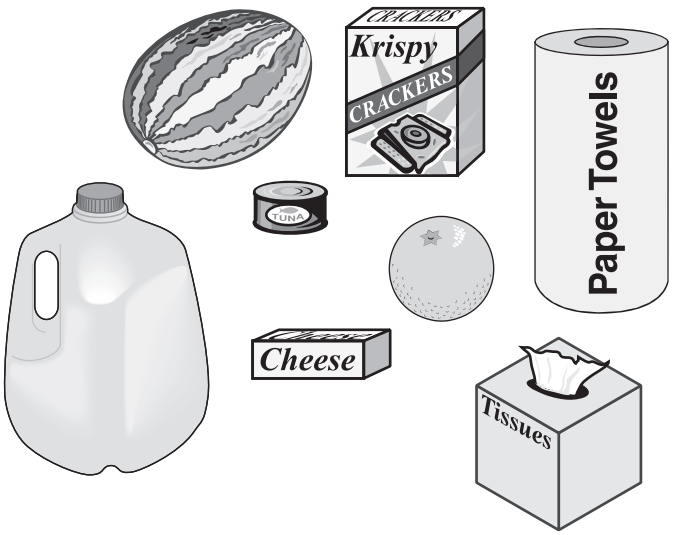
A. 4.5 meters, 4.5 meters

B. 0.2 meter, 0.8 meter

C. 2.6 meters, 8.4 meters

D. 6.3 meters, 3.7 meters

6 The picture below shows the items Mr. Rowland bought at a grocery store.



Three of the items are the same shape. What is the shape?

A. cube
B. sphere
C. cylinder
D. rectangular prism

7 Leanne jumped a distance of 3 feet 8 inches. Monica jumped a distance of 4 feet 6 inches. How many more inches did Monica jump than Leanne? [1 foot = 12 inches]

A. 8 inches
B. 10 inches
C. 12 inches
D. 14 inches

8 What is the value of $5 \times (2 + 6)$?

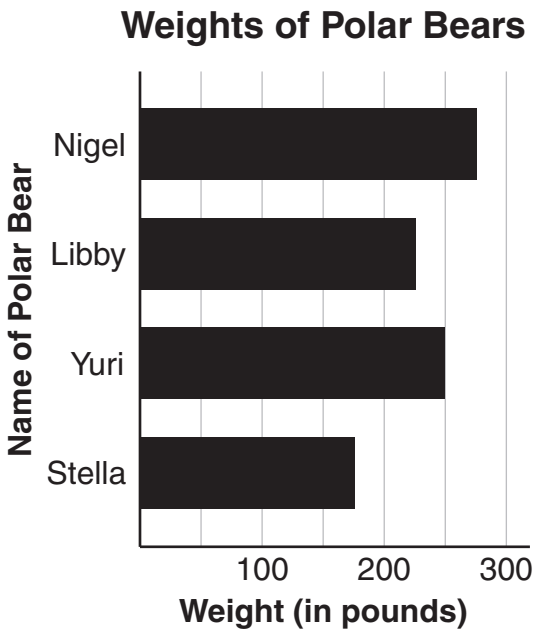
A. 13

B. 16

C. 18

D. 40

9 This bar graph shows the weights of four baby polar bears at a zoo.



Which polar bear weighs about 225 pounds?

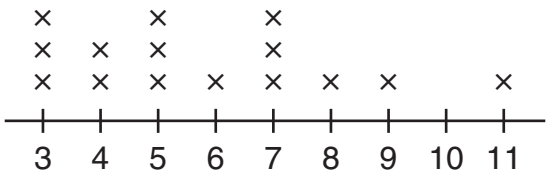
A. Nigel

B. Libby

C. Yuri

D. Stella

10 This line plot shows the heights of plants grown by students in a science class.



Heights of Plants (in centimeters)

What is the range of the heights of the plants?

A. 3

B. 5

C. 8

D. 11

⓫ Tonya is thinking of a number that follows these rules.

- The number is written using each of the digits 1, 4, 6, 7, and 8 exactly once.
- The number is greater than 48,682 and less than 48,722.

What is Tonya's number?

⓬ Look at this pattern.

Step 1	Step 2	Step 3	Step 4
			
8 Stars	14 Stars	20 Stars	26 Stars

Write a rule to find the number of stars in Step 5.

13 There are 24 hours in one day. A koala bear sleeps k hours each day.

a. Find the value of the expression $24 - k$ for $k = 16$.

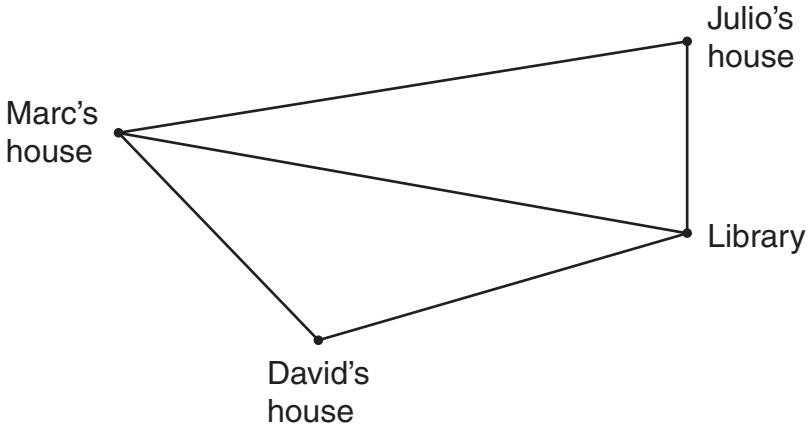
b. In terms of the koala bear, what is the meaning of the expression $24 - k$?

14 This table shows the numbers of baseball cards seven students collected.

Student	Number of Baseball Cards
Harriet	62
John	54
Kate	56
Raul	50
Masako	52
Charlie	53
Dewayne	58

What is the median number of baseball cards the students collected? Show your work or explain how you know.

15 Use your ruler and the map below to answer this question.



Scale
1 inch represents 4 miles

a. What is the shortest distance, in miles, from Julio's house to the library?

b. What is the shortest distance, in miles, from Marc's house to Julio's house?

c. Marc is going to the library from his house. How many **more** miles will he have to go if he stops at David's house on the way rather than going straight to the library? Show your work or explain how you know.

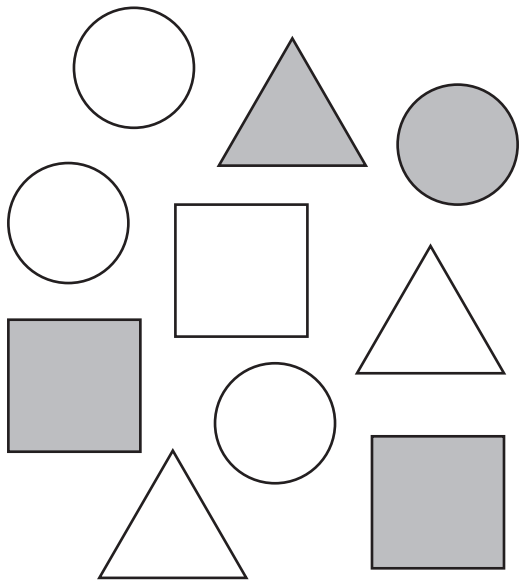
New England Common Assessment Program

Released Items Support Materials 2009

Grade 5 Mathematics

N&O 4.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations;** and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, *a*/4, *a*/5, *a*/6, *a*/8, or *a*/10, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area, set, or linear models where the number of parts in the whole are equal to, and a multiple or factor of the denominator; and **decimals** as hundredths within the context of money, or tenths within the context of metric measurements (e.g., 2.3 cm) **using models, explanations, or other representations.**

1 Look at this set of shapes.



What fraction of the set of shapes is shaded gray?

A. $\frac{4}{10}$

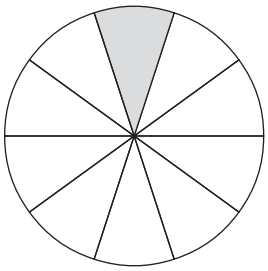
B. $\frac{4}{6}$

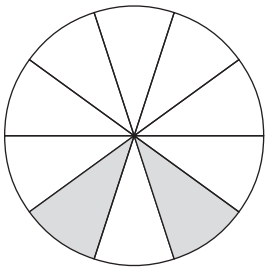
C. $\frac{6}{4}$

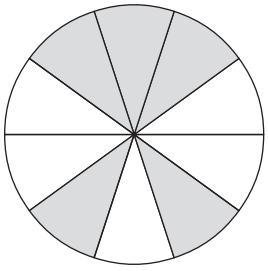
D. $\frac{10}{4}$

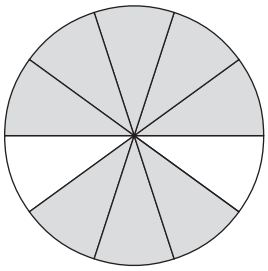
N&O 4.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations;** and **positive fractional numbers** (benchmark fractions: *a*/2, *a*/3, *a*/4, *a*/5, *a*/6, *a*/8, or *a*/10, where *a* is a whole number greater than 0 and less than or equal to the denominator) as a part to whole relationship in area, set, or linear models where the number of parts in the whole are equal to, and a multiple or factor of the denominator; and **decimals** as hundredths within the context of money, or tenths within the context of metric measurements (e.g., 2.3 cm) **using models, explanations, or other representations.**

❷ Which picture shows $\frac{1}{5}$ of the circle shaded gray?

A. 

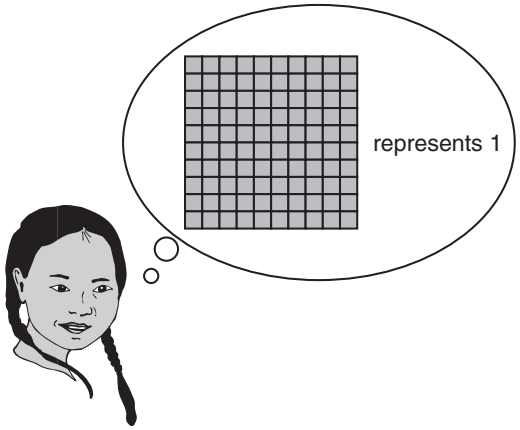
B. 

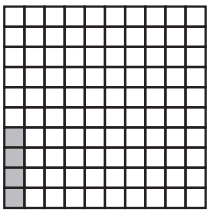
C. 

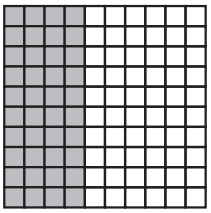
D. 

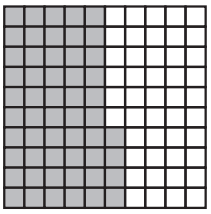
N&O 4.2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 999,999 by ordering or comparing whole numbers; and ordering, comparing, or identifying equivalent proper positive fractional numbers; or decimals using models, number lines, or explanations.

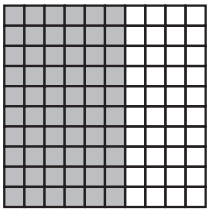
3 Which model is shaded gray to represent a decimal **greater** than 0.3 and **less** than 0.5?



A. 

B. 

C. 

D. 

N&O 4.3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the relationship between repeated subtraction and division (no remainders); the inverse relationship between multiplication and division of whole numbers; or the addition or subtraction of positive fractional numbers with like denominators using models, number lines, or explanations.

4 Look at this number sentence.

$$\mathbf{12 \times \square = 168}$$

Which number sentence is equivalent to the number sentence above?

A. $168 \times 12 = \square$

B. $168 \div 12 = \square$

C. $\square \div 12 = 168$

D. $168 - \square = 12$

N&O 4.4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors and multiples; and addition or subtraction of decimals and positive proper fractions with like denominators. (Multiplication limited to 2 digits by 2 digits, and division limited to 1 digit divisors.)

5 A rope that is 10 meters long is cut once. Which measures could be the lengths of the two pieces?

A. 4.5 meters, 4.5 meters

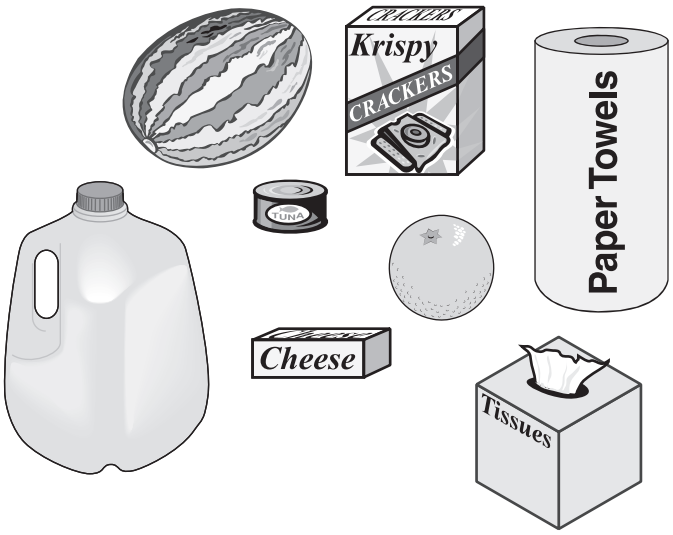
B. 0.2 meter, 0.8 meter

C. 2.6 meters, 8.4 meters

D. 6.3 meters, 3.7 meters

G&M 4.3 **Uses properties or attributes** (shape of bases or number of lateral faces) to **identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, or spheres).

6 The picture below shows the items Mr. Rowland bought at a grocery store.



Three of the items are the same shape. What is the shape?

A. cube
B. sphere
C. cylinder
D. rectangular prism

G&M 4.7 **Measures and uses units of measures appropriately and consistently, and makes conversions within systems when solving problems** across the content strands.

7 Leanne jumped a distance of 3 feet 8 inches. Monica jumped a distance of 4 feet 6 inches. How many more inches did Monica jump than Leanne?
[1 foot = 12 inches]

A. 8 inches
B. 10 inches
C. 12 inches
D. 14 inches

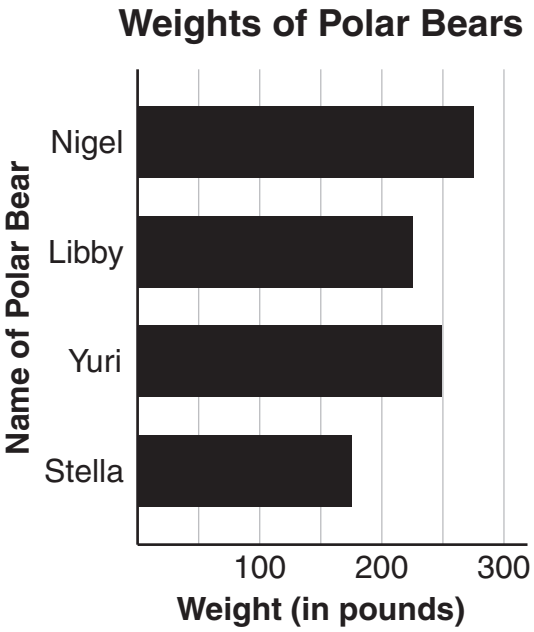
F&A 4.4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions, by simplifying numerical expressions where left to right computations may be modified only by the use of parentheses [e.g., $14 - (2 \times 5)$] (expressions consistent with the parameters of M(F&A)–4–3), and by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, where a, b, and c are whole numbers with $a \neq 0$.

8 What is the value of $5 \times (2 + 6)$?

A. 13
B. 16
C. 18
D. 40

DSP 4.1 **Interprets a given representation** (line plots, tables, bar graphs, pictographs, or circle graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M(DSP)–4–2.*)

9 This bar graph shows the weights of four baby polar bears at a zoo.

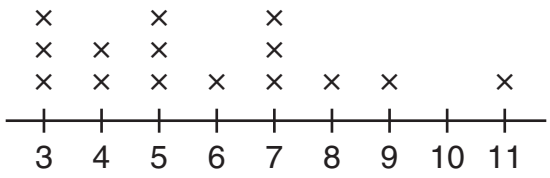


Which polar bear weighs about 225 pounds?

A. Nigel
B. Libby
C. Yuri
D. Stella

DSP 4.2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (median or mode), or range.

10 This line plot shows the heights of plants grown by students in a science class.



Heights of Plants (in centimeters)

What is the range of the heights of the plants?

A. 3

B. 5

C. 8

D. 11

N&O 4.2 **Demonstrates understanding of the relative magnitude of numbers** from 0 to 999,999 by ordering or comparing whole numbers; and ordering, comparing, or identifying equivalent proper positive fractional numbers; or decimals using models, number lines, or explanations.

11 Tonya is thinking of a number that follows these rules.

- The number is written using each of the digits 1, 4, 6, 7, and 8 exactly once.
- The number is greater than 48,682 and less than 48,722.

What is Tonya's number?

Scoring Guide

Score	Description
1	for correct answer, **48,716**
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

SCORE POINT 1
(EXAMPLE A)

11

Tonya's number is 48,716.

The student's response is correct.

SCORE POINT 0
(EXAMPLE A)

11

48,761

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

11

48,692 is Tonya's number.

The student's response is incorrect. (Student did not use digits given in problem.)

F&A 4.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables or sequences; and writes a rule in words or[sc] symbols to find the next case.

12 Look at this pattern.

Step 1	Step 2	Step 3	Step 4
			
8 Stars	14 Stars	20 Stars	26 Stars

Write a rule to find the number of stars in Step 5.

Scoring Guide

Score	Description
1	for correct rule
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Responses:

Add 6 stars (to number of stars in step 4)

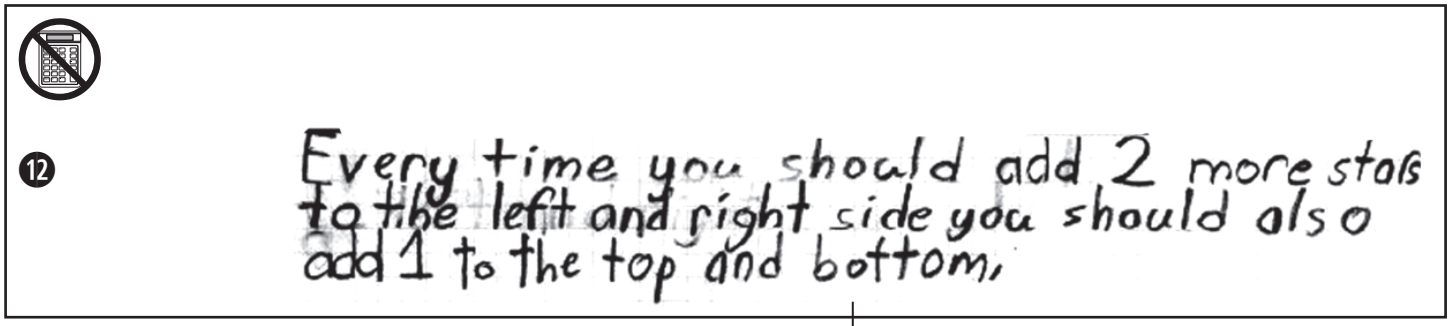
or

Increase "height" of rectangle by 2 stars and "width" by 1 star

or

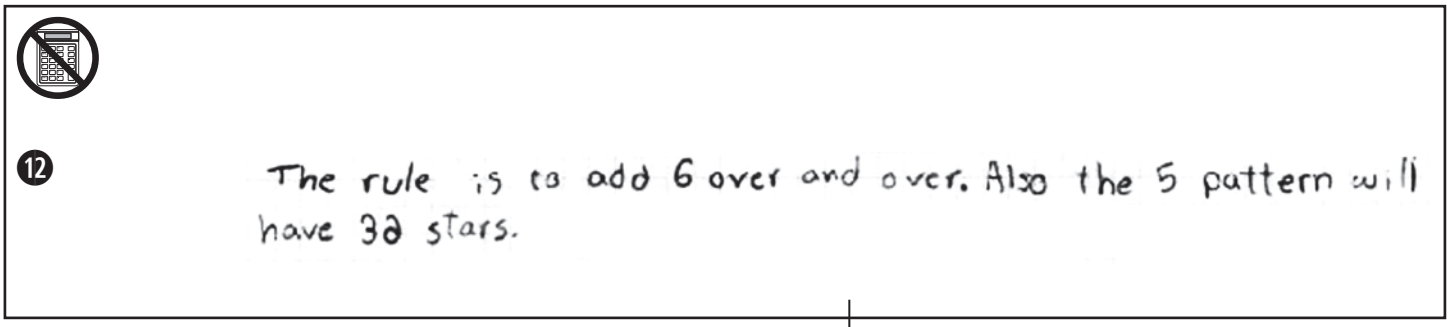
6 × step number + 2

SCORE POINT 1
(EXAMPLE A)



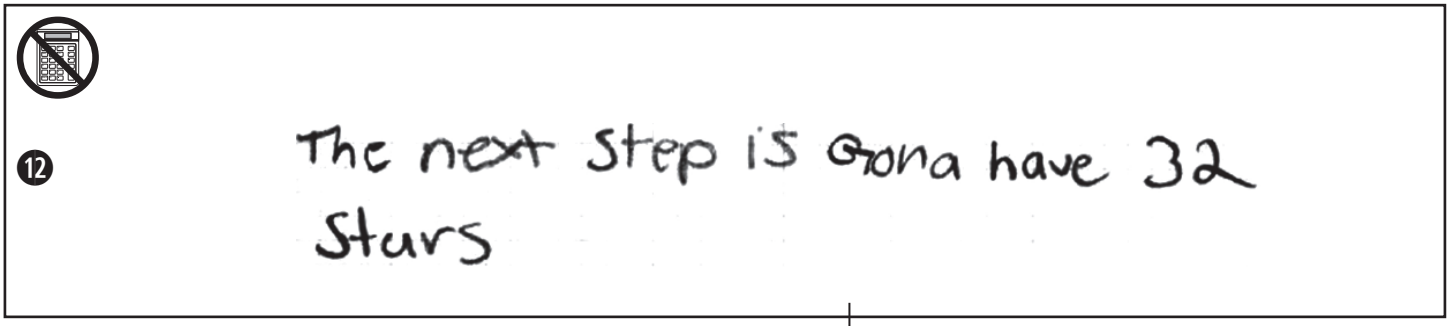
The student's response is correct.

SCORE POINT 1
(EXAMPLE B)



The student's response is correct.

SCORE POINT 0
(EXAMPLE A)



The student's response is incorrect.

F&A 4.3 **Demonstrates conceptual understanding of algebraic expressions** by using letters or symbols to represent unknown quantities to write simple linear algebraic expressions involving any one of the four operations; or by evaluating simple linear algebraic expressions using whole numbers.

13 There are 24 hours in one day. A koala bear sleeps k hours each day.

a. Find the value of the expression $24 - k$ for $k = 16$.

b. In terms of the koala bear, what is the meaning of the expression $24 - k$?

Scoring Guide

Score	Description
2	for correct answer to part a, **8**, and part b
1	for correct answer to part a or for correct answer to part b
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Response:

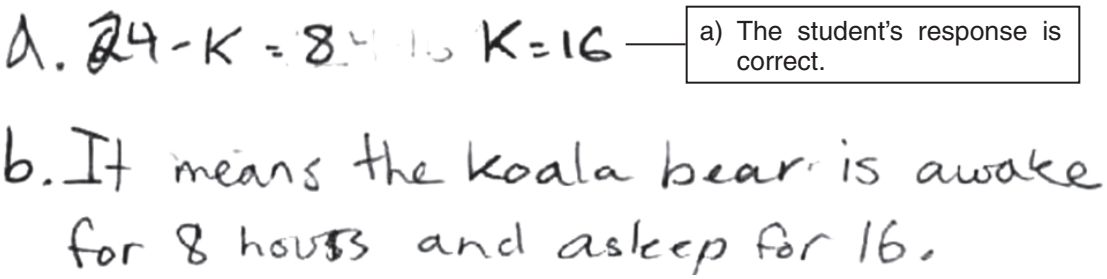
Part b: Number of hours the koala bear is awake

OR

The koala bear is awake for 8 hours (or hours based on incorrect part a.).

Score Point 2
(Example A)

13



a) The student's response is correct.

b) The student's explanation is correct.

Score Point 1
(Example A)

13

a) The student's response is correct.

b) The student did not attempt.

SCORE POINT 1
(EXAMPLE B)

a) The student's response is correct.

13

K=16 24-K=8 a

Koala Bear Sleeps 8 hours

a Day.

b) The student's explanation is incorrect.

SCORE POINT 0
(EXAMPLE A)

13

a. 24-8=16

a) The student's response is incorrect.

b. 24-K means what the answer of

24 ÷K=16

K=8

b) The student's explanation is incorrect.

SCORE POINT 0
(EXAMPLE B)

13

24
-16
08

7 Hours

a) The student's response is incorrect.

b) The student did not attempt.

DSP 4.2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (median or mode), or range.

14 This table shows the numbers of baseball cards seven students collected.

Student	Number of Baseball Cards
Harriet	62
John	54
Kate	56
Raul	50
Masako	52
Charlie	53
Dewayne	58

What is the median number of baseball cards the students collected? Show your work or explain how you know.

Scoring Guide

Score	Description
2	for correct answer, **54**, with sufficient explanation or work shown to indicate correct strategy
1	for correct answer with insufficient or no work or explanation or for sufficient strategy with incorrect or no answer
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Response:

I put the numbers in order: 50, 52, 53, 54, 56, 58, 62. 54 is directly in the middle.

SCORE POINT 2
(EXAMPLE A)

14

50, 52, 53, (54), 56, 58, 62

The student's response is correct with sufficient work shown.

SCORE POINT 2
(EXAMPLE B)

14

First I will put the nombers in order.

~~50~~, ~~52~~, ~~53~~, 54, ~~56~~, ~~58~~, ~~62~~

Second I will cross off ~~50~~ and 62. Now 52 and 58. Now 53 and 56.

The student's response is correct with sufficient explanation given.

So 54 is my Median (middle number)

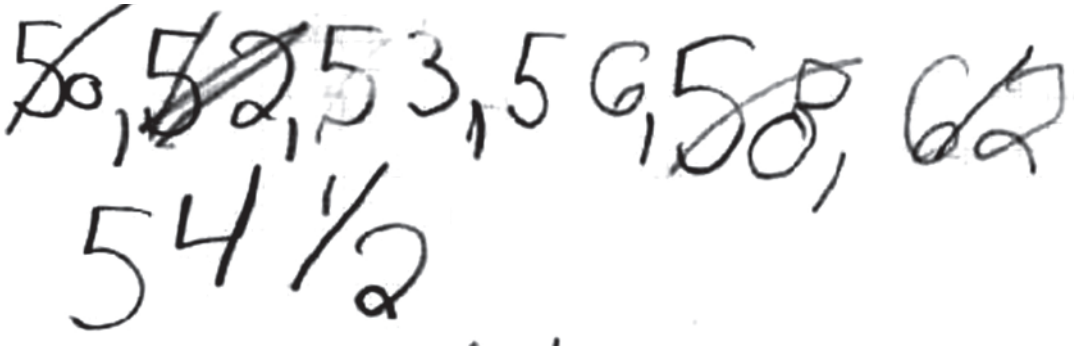
Score Point 1
(Example A)

14

The student's response is correct without work shown or explanation given.

Score Point 1
(Example B)

14



The student's strategy is appropriate. Answer is incorrect due to transcription error.

SCORE POINT 0
(EXAMPLE A)

14

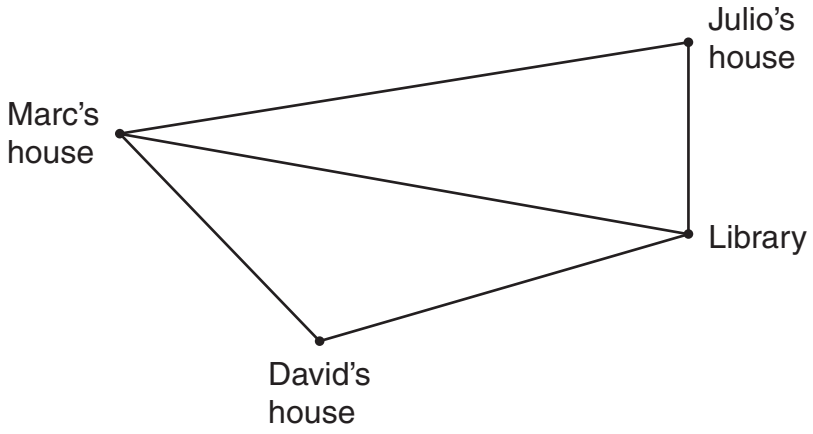
The median is 62
because that is the
Most.

All the cards
together will be
385cards.

The student's response is incorrect.

G&M 4.5 **Demonstrates conceptual understanding of similarity** by applying scales on maps, or applying characteristics of similar figures (same shape but not necessarily the same size) to identify similar figures, or to solve problems involving similar figures. Describes relationships using models or explanations.

15 Use your ruler and the map below to answer this question.



Scale
1 inch represents 4 miles

a. What is the shortest distance, in miles, from Julio's house to the library?

b. What is the shortest distance, in miles, from Marc's house to Julio's house?

c. Marc is going to the library from his house. How many **more** miles will he have to go if he stops at David's house on the way rather than going straight to the library? Show your work or explain how you know.

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes

Part a: 1 point for correct answer, **4** (miles) (acceptable range: 3.5–4.5)

Part b: 1 point for correct answer, **12** (miles) (acceptable range: 11.5–12.5)

Part c: 2 points for correct answer, **2** (miles) (acceptable range: 1.5–2.5), with sufficient explanation or work shown to indicate correct strategy

OR

1 point for correct answer with insufficient or no work or explanation

or

for sufficient strategy with incorrect or no answer

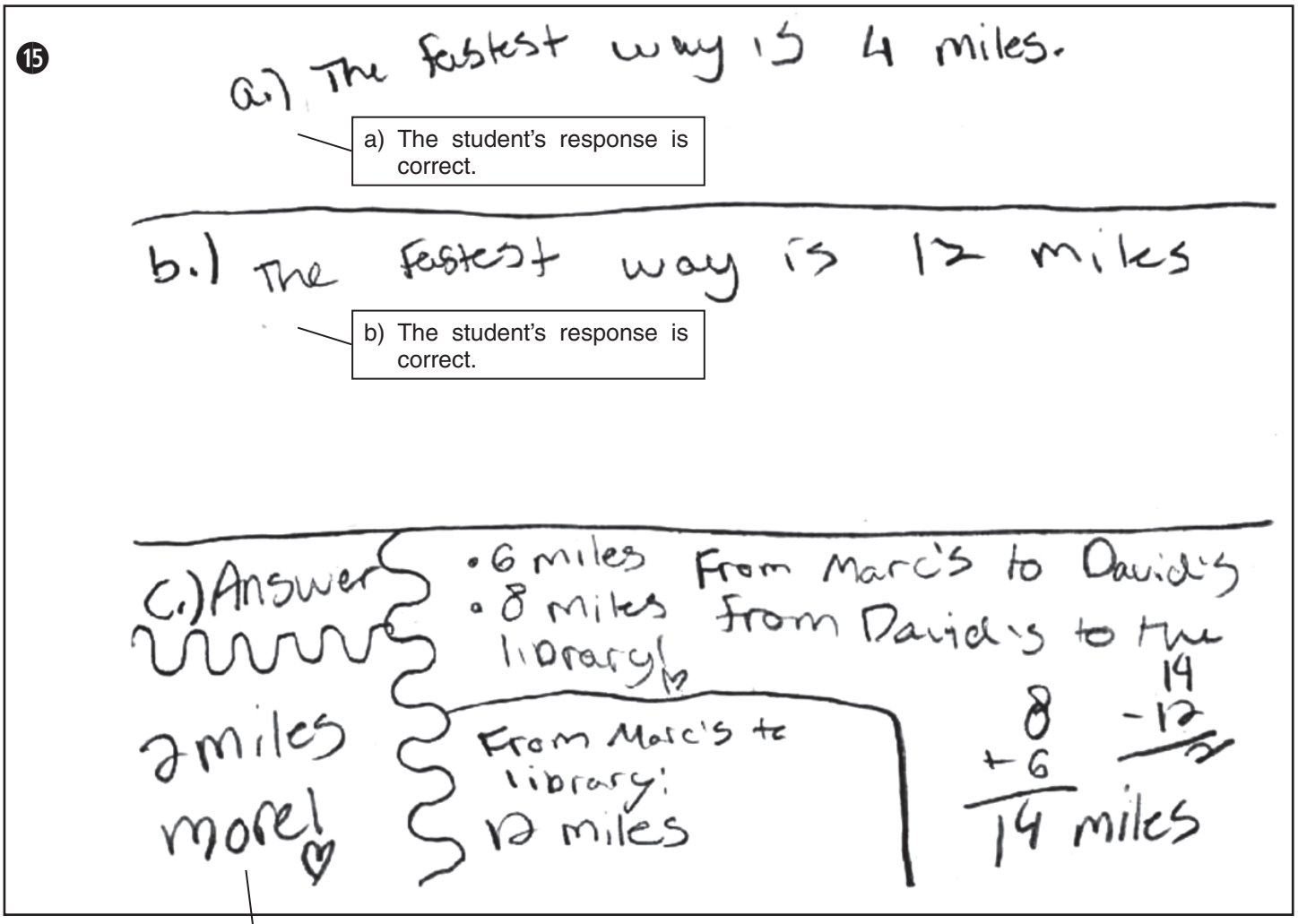
or

for correctly determining the distance from Marc's house to the library via David's house, **14** (miles)

Sample Response:

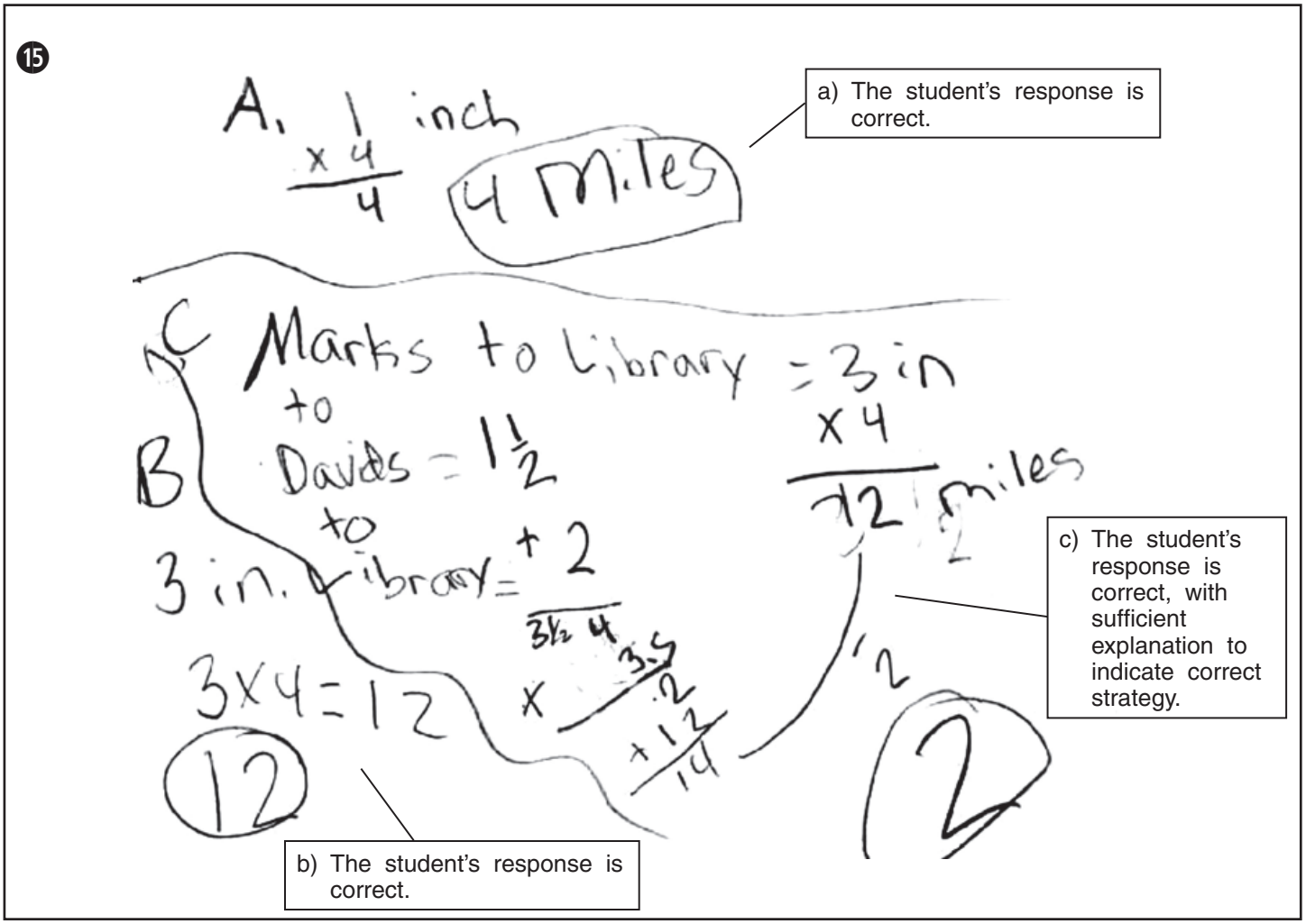
Part c: 2 miles farther. It is 3 inches from Marc's house to the library. That is 12 miles. It is 1.5 inches from Marc's house to David's house. That is $4 + 2 = 6$ miles. It is 2 inches from David's house to the library. $2 \times 4 = 8$. Marc will have to go $6 + 8 = 14$ miles to stop at David's house on the way to the library. So he will have to go $14 - 12 = 2$ more miles to stop at David's house.

SCORE POINT 4
(EXAMPLE A)



SCORE POINT 4
(EXAMPLE B)

15



a) The student's response is correct.

b) The student's response is correct.

c) The student's response is correct, with sufficient explanation to indicate correct strategy.

SCORE POINT 3
(EXAMPLE A)

15

From Julio's house to the library it's 4 miles. From Marc's house to Julio's it's 12 miles.

a) The student's response is correct.

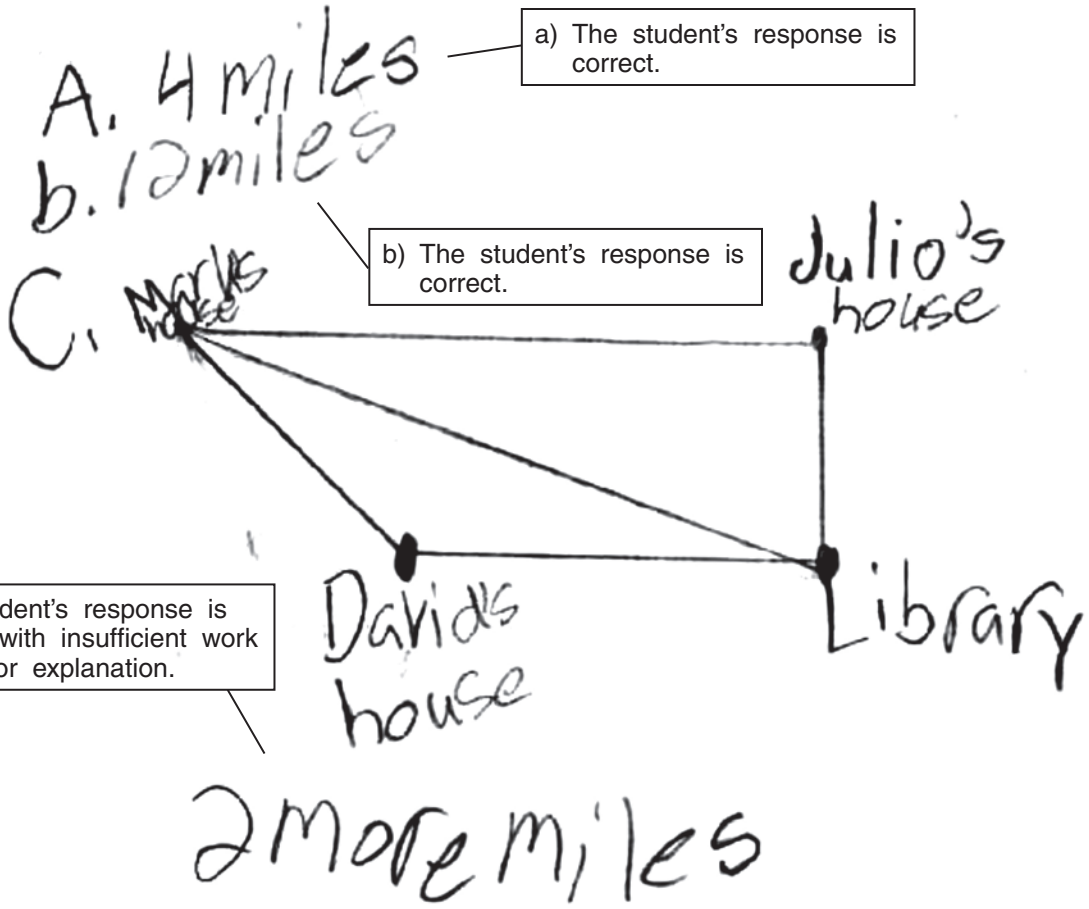
b) The student's response is correct.

From Marc's house to David's house it's 6 miles and from David's house to the library it's 8. So it took Marc 14 miles to get to the library.

c) The student correctly determines the distance from Marc's house to the library via David's house.

SCORE POINT 3
(EXAMPLE B)

15



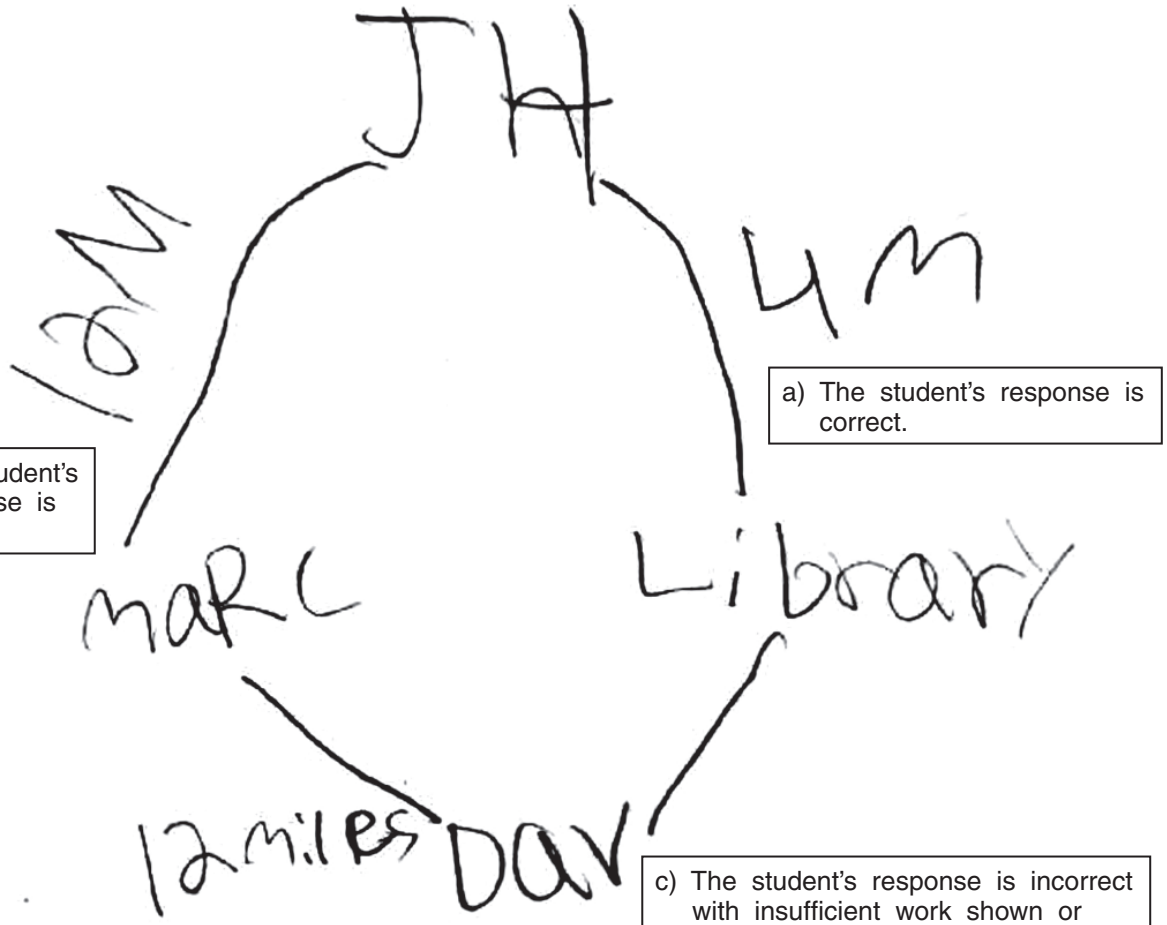
a) The student's response is correct.

b) The student's response is correct.

c) The student's response is correct with insufficient work shown or explanation.

SCORE POINT 2
(EXAMPLE A)

15



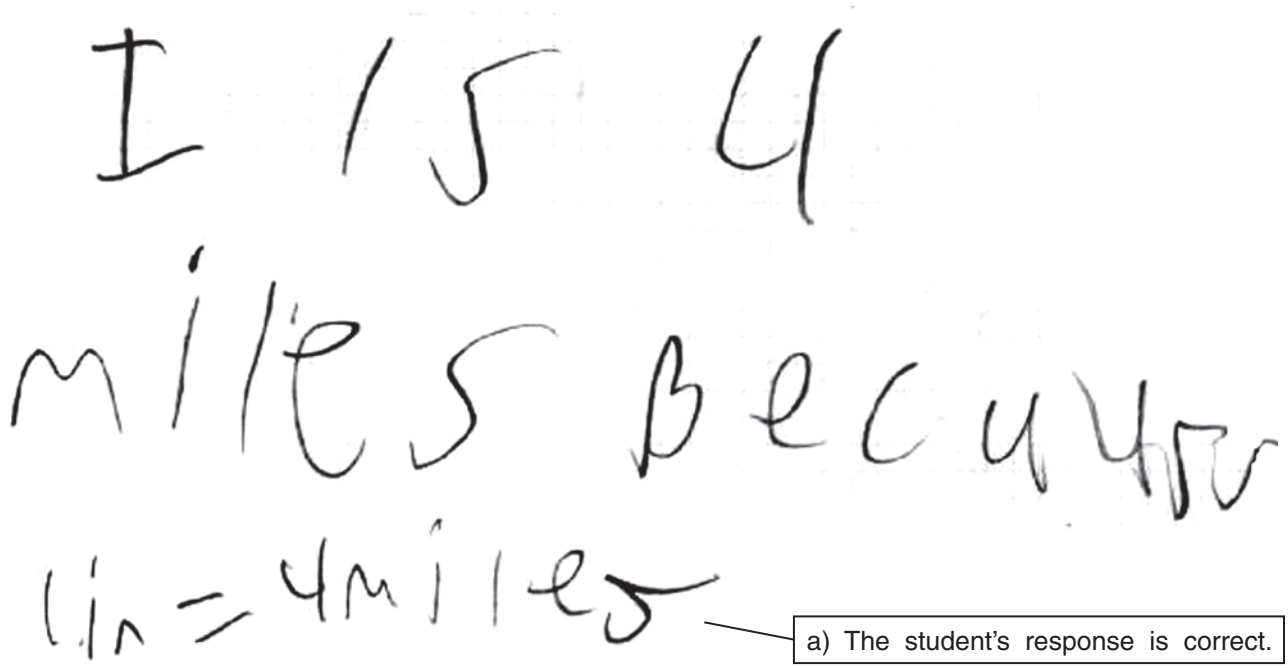
a) The student's response is correct.

b) The student's response is correct.

c) The student's response is incorrect with insufficient work shown or explanation.

SCORE POINT 1
(EXAMPLE A)

15



a) The student's response is correct.

b) The student did not attempt.

c) The student did not attempt.

SCORE POINT 1
(EXAMPLE B)

15

A. 64 miles

a) The student's response is incorrect.

B. 12 miles

b) The student's response is correct.

C. He will have to go 4 more miles.

c) The student's response is incorrect with insufficient work shown or explanation.

SCORE POINT 0
(EXAMPLE A)

15

(A) 1 mile is the shorted distance to the library.

a) The student's response is incorrect.

(B.) 3 miles is the shortes distence from Marcs house to Julios house.

b) The student's response is incorrect.

(C.) The distance from Marcs house to Davids then to the library is 9 miles.

c) The student's response is incorrect. with incorrect strategy.

4+5=9

Grade 5 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Tools Allowed				✓	✓							✓		✓	
Content Strand[1]	NO	NO	NO	NO	NO	GM	GM	FA	DP	DP	NO	FA	FA	DP	GM
GLE Code	4-1	4-1	4-2	4-3	4-4	4-3	4-7	4-4	4-1	4-2	4-2	4-1	4-3	4-2	4-5
Depth of Knowledge Code	1	2	2	1	2	1	2	1	1	1	1	2	2	1	2
Item Type[2]	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	SA	SA	SA	SA	CR
Answer Key	A	B	B	B	D	D	B	D	B	C					
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4

[1]Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

[2]Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response